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⑤④ Multi-station document inserter with automatic startup and shutdown document collation sequences.

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⑤⑥ References cited:
US-A-3 606 728
US-A-3 870 295
US-A-3 905 594
US-A-3 934 867
US-A-3 935 429

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Description

The present invention relates to document inserters, and more particularly to multi-station document inserters.

Known multi-station document inserters require substantial training of inserter operators to enable them to locate any documents present on the transport deck of the inserter prior to start up or after shut down and to manipulate the documents and feeder modules to provide a complete document collation when the inserter is activated. That is, prior to start up the operator would often have to remove the documents from the transport deck and reinsert them by hand into the proper feeders or discard them.

In U.S. Patent (US—A—) 3 606 728 there is shown a multi-station inserter machine which has a plurality of document feeder modules, an envelope feeder module, switch means for activating these, and a supervisory control means. However, this U.S. Patent does not appreciate the need for a particular operation upon start-up and shut-down. That is, it does not disclose a means for avoiding the manual clearance of the feed deck of the machine as is discussed above in connection with the prior art.

According to the present invention, there is provided a multi-station document inserter comprising:—

- a plurality of document feeder modules;
- an envelope feeder module for feeding envelopes and inserting stacks of collated documents into the envelopes;

- a transport deck for transmitting documents from the document feeder modules to the envelope feeder module;

- supervisory control means for transmitting control signals in a machine cycle to activate and deactivate the various feeder modules;

- distributed processing means associated with each of said document feeder modules, said distributing processing means receiving the control signals from said supervisory control means;

- the supervisory control means being arranged, upon start-up of the inserter, to transmit a control signal in each machine cycle to activate the document feeder modules one-by-one in sequence beginning with the document feeder module most remote from the envelope feeder module so that a completely collated initial stack of documents is transmitted to the envelope feeder module and arranged thereafter to transmit control signals to activate all of the document feeder modules in each machine cycle;

- characterised in that:

- upon shutdown of the inserter, the supervisory control means transmits a control signal in each machine cycle to deactivate the document feeder modules one-by-one in sequence beginning with the document feeder module most

remote from the envelope feeder module so that a completely collated final stack of documents is transmitted to the envelope feeder module and inserted into an envelope, and no documents remain on the transport deck.

The present invention also provides for a method for automatically providing completely collated stacks of documents in a multi-station document inserter, which method is claimed in Claim 2.

The invention will be better understood from the following non-limiting description of an example thereof given with reference to the accompanying drawings in which:—

Figure 1 is a schematic view of the arrangement of the feeder modules for a six station document inserter, excluding the envelope feeder module; and

Figure 2 is a flow chart of the supervisory program illustrating the Sequence Start and Clear Deck Routines used in a document inserter according to the present invention.

Referring to Figure 1, one arrangement for a multi-station document inserter is illustrated as 10. The details of such a multi-station document inserter, including the programs and circuitry therefor, are disclosed in U.S. Patent Application Serial No. 394,388, European Patent Publication EP—A—102 699 of which the inventors are Peter N. Piotroski and John M. Gomes, entitled, Universal Multi-station Document Inserter the disclosure of which is incorporated herein by reference.

As illustrated in Figure 1, the document inserter 10 includes a plurality of feeder modules 12, 14, 16, 18, 20, 22 and 24. Feeder module 12 is an envelope feeder and is positioned at one end of transport deck or path 26. The other document feeder modules, 14—24, may comprise any type feeder modules, such as those disclosed in the aforementioned patent application. Further, the feeder module 24, which is the feeder module most remote from the envelope feeder module 12, is typically a control document feeder. Moreover, it is the first document feeder along the document transport path 26 of the inserter 10 since the documents are fed from left to right in the direction of the arrow in Figure 1. Further, as disclosed in the aforementioned copending patent application, the feeder modules 14—24 typically include scanners for communicating with the supervisory control circuit 28. Further, the supervisory control circuit 28 includes a plurality of PROMS programmed to operate the inserter in accordance with a desired customer configuration.

The operator actuates a switch (finger touch) on the central control display 30 to initiate the Sequence Start Routine. Upon activation of the switch for the Sequence Start Routine, the supervisory control circuit 28 initiates a Sequence Start Routine. In carrying out this routine, signals are sequentially transmitted from the supervisory control circuit 28 to each uniquely addressed feeder module and the dis-

tributed processor associated therewith over signal bus 32 beginning with the feeder module 24 most remote from the envelope feeder module 12. In response to a signal from the supervisory control circuit 28, the addressed distributed processor activates the appropriate module devices (motor, clutch, and brake) for one cycle to feed a document(s) onto the transport deck 26. The supervisory control circuit 28 then transmits a signal to the next uniquely addressed feeder module 22 and its associated distributed processor activates the appropriate module devices for one cycle to feed a document(s) onto the transport deck 26. This process is repeated sequentially for the remaining feeder modules 20—12 so that a completely collated stack of documents is transmitted to and inserted into the envelope at the envelope feeder module 12. Thereafter, all of the feeder modules feed documents onto the transport deck 26 every cycle.

The operator also actuates a switch (finger touch) on the central control display 30 to initiate the Clear Deck (Sequence Stop) Routine. Thereupon, the supervisory control circuit 28 initiates the Clear Deck Routine. In carrying out the routine, signals are sequentially transmitted from the supervisory control circuit 28 to each uniquely addressed feeder module and the distributed processor associated therewith, beginning with the feeder module 24 most remote from the envelope feeder module 12. The supervisory control circuit 28 sends a signal to the distributed processor to deactivate the feeder module 24. After feeder module 24 is deactivated, the supervisory control circuit 28 sends a signal to the adjacent module 22 to deactivate it. This process is repeated sequentially for the remaining modules 20—12 so that a final completely collated stack of documents is transmitted to and inserted into an envelope at the envelope feeder module 12. That is, no documents will remain on the transport deck 26.

As apparent from the flow chart 34 in Figure 2, once the supervisory control circuit 28 initiates the Sequence Start Routine, the inserter 10 is sequenced on for one cycle with the first feeder module 24, (the one most remote from the envelope feeder module 12) feeding a document(s) onto the transport deck 26. The adjacent feeder module 22 is then sequenced on for one cycle to feed a document(s) onto the transport deck 26. This process is continued sequentially with the remaining feeder modules 20—14, to provide a complete collation of documents for insertion into an envelope feeder module 12. Thereafter, the inserter 10 will undergo continuous operation by feeding the proper documents from each feeder module, 24—14, and the envelope from envelope feeder 12, during each cycle, as described in the aforementioned copending patent application.

Once the supervisory control circuit 28 initiates the Clear Deck Routine, the inserter 10 is sequenced off with the first feeder module 24 (the one most remote from the envelope feeder mod-

ule 12) being deactivated after it has fed a document(s) onto the transport deck 26. The adjacent feeder module 22 is then sequenced off after it has fed a document(s) onto the transport deck 26. This process is continued sequentially with the remaining feeder modules 20—14 to provide a final completely collated stack of documents for insertion into an envelope at the envelope feeder module 12 without any documents remaining on the transport deck 26.

Claims

1. A multi-station document inserter comprising:—

a plurality of document feeder modules; an envelope feeder module for feeding envelopes and inserting stacks of collated documents into the envelopes;

a transport deck for transmitting documents from the document feeder modules to the envelope feeder module;

supervisory control means for transmitting control signals in a machine cycle to activate and deactivate the various feeder modules;

distributed processing means associated with each of said document feeder modules, said distributing processing means receiving the control signals from said supervisory control means;

the supervisory control means being arranged, upon start-up of the inserter, to transmit a control signal in each machine cycle to activate the document feeder modules one-by-one in sequence beginning with the document feeder module most remote from the envelope feeder module so that a completely collated initial stack of documents is transmitted to the envelope feeder module and arranged thereafter to transmit control signals to activate all of the document feeder modules in each machine cycle;

characterised in that:

upon shutdown of the inserter, the supervisory control means transmits a control signal in each machine cycle to deactivate the document feeder modules one-by-one in sequence beginning with the document feeder module most remote from the envelope feeder module so that a completely collated final stack of documents is transmitted to the envelope feeder module and inserted into an envelope, and no documents remain on the transport deck.

2. A method for automatically providing completely collated stacks of documents in a multi-station document inserter station having a plurality of document feeder modules, an envelope feeder module which feeds envelopes and inserts collated stacks of documents into the envelopes and a transport deck transmitting documents from the document feeder modules to the envelope feeder module, and supervisory control means for transmitting control signals in a machine cycle to activate and deactivate the various feeder modules, said method comprising the steps of

transmitting upon start-up of the inserter, a

control signal in each machine cycle to activate the document feeder modules one-by-one in sequence beginning with the document feeder module most remote from the envelope feeder module so that a completely collated initial stack of documents is transmitted to the envelope feeder module, and

thereafter, transmitting control signals to activate all of the document feeder modules in each machine cycle, the method being characterised by further transmitting upon shutdown of the inserter, a control signal in each machine cycle to deactivate the document feeder modules one-by-one in sequence beginning with the document feeder module most remote from the envelope feeder module so that a completely collated final stack of documents is transmitted to the envelope feeder module and inserted into an envelope, and no documents remain on the transport deck.

Patentansprüche

1. Dokumenteneinleger mit mehreren Stationen, umfassend:

mehrere Dokumentenzuführbaugruppen;
eine Umschlagzuführbaugruppe zum Zuführen von Umschlägen und zum Einlegen von Stapeln kollationierter Dokumente in die Umschläge;

ein Transportdeck zum Überführen der Dokumente von den Dokumentenzuführbaugruppen zu der Umschlagzuführbaugruppe;

Überwachungssteuermittel zum Abgeben von Steuersignalen in einem Maschinenzyklus zum Ein- und Ausschalten der verschiedenen Zuführbaugruppen;

gestaffelte Bearbeitungsmittel, die jeder der Dokumentenzuführbaugruppen zugeordnet sind, wobei diese gestaffelten Bearbeitungsmittel die Steuersignale von den besagten Überwachungssteuermitteln empfangen;

wobei die Überwachungssteuermittel so angeordnet sind, um beim Einschalten des Einlegers ein Steuersignal in jedem Maschinenzyklus abzugeben, um die Dokumentenzuführbaugruppen beginnend mit der von der Umschlagzuführbaugruppe am weitesten entfernten Zuführbaugruppe nacheinander einzuschalten, so daß ein vollständig kollationierter anfänglicher Stapel von Dokumenten zu der Umschlagzuführbaugruppe überführt wird, und so angeordnet sind, um sodann Steuersignale abzugeben, um alle Dokumentenzuführbaugruppen in jedem Maschinenzyklus einzuschalten;

dadurch gekennzeichnet,

daß beim Ausschalten des Einlegers die Überwachungssteuermittel ein Steuersignal in jedem Maschinenzyklus abgeben, um die Dokumentenzuführbaugruppen beginnend mit der von der Umschlagzuführbaugruppe am weitesten entfernten Zuführbaugruppe nacheinander auszuschalten, so daß ein vollständig kollationierter abschließender Stapel von Dokumenten zu der Umschlagzuführbaugruppe überführt und in einen Umschlag eingelegt wird und keine Dokumente auf dem Transportdeck zurückbleiben.

2. Verfahren zur automastischen Bereitstellung vollständig kollationierter Stapel von Dokumenten in einem Dokumenteneinleger mit mehreren Stationen, der mehrere Dokumentenzuführbaugruppen, eine Umschlagzuführbaugruppe, die Umschläge zuführt und kollationierte Stapel von Dokumenten in die Umschläge einlegt, ein Transportdeck zum Überführen der Dokumente von den Dokumentenzuführbaugruppen zu der Umschlagzuführbaugruppe und Überwachungssteuermittel aufweist, um Steuersignale in einem Maschinenzyklus abzugeben, um die verschiedenen Zuführbaugruppen ein- und auszuschalten, wobei dieses Verfahren folgende Schritte umfaßt:

nach dem Einschalten des Einlegers Abgeben eines Steuersignals in jedem Maschinenzyklus, um die Dokumentenzuführbaugruppen beginnend mit der von der Umschlagzuführbaugruppe am weitesten entfernten Zuführbaugruppe nacheinander einzuschalten, so daß ein vollständig kollationierter anfänglicher Stapel von Dokumenten zu der Umschlagzuführbaugruppe überführt wird, und

sodann Abgeben von Steuersignalen, um alle Dokumentenzuführbaugruppen in jedem Maschinenzyklus einzuschalten, wobei das Verfahren dadurch gekennzeichnet, ist

daß nach dem Ausschalten des Einlegers ferner ein Steuersignal in jedem Maschinenzyklus abgegeben wird, um die Dokumentenzuführbaugruppen beginnend mit der von der Umschlagzuführbaugruppe am weitesten entfernten Zuführbaugruppe nacheinander auszuschalten, so daß ein vollständig kollationierter abschließender Stapel von Dokumenten zu der Umschlagzuführbaugruppe überführt und in einen Umschlag eingelegt wird und keine Dokumente auf dem Transportdeck verbleiben.

Revendications

1. Appareil de mise de documents sous enveloppe à plusieurs postes, comprenant:

plusieurs modules d'alimentation en documents,

un module d'alimentation en enveloppes, et de mise de piles de documents classés dans les enveloppes,

une plate-forme de transport destinée à transmettre des documents des modules d'alimentation en documents au module d'alimentation en enveloppes,

un dispositif de commande et de surveillance destiné à transmettre des signaux de commande au cours d'un cycle de la machine afin que les divers modules d'alimentation soient activés et désactivés,

un dispositif de traitement réparti associé à chacun des modules d'alimentation en documents, le dispositif de traitement réparti recevant des signaux de commande du dispositif de commande et de surveillance,

le dispositif de commande et de surveillance étant réalisé de manière que, lors de la mise en fonctionnement de l'appareil de mise sous enve-

loppe, il transmette un signal de commande, à chaque cycle de la machine, provoquant l'activation des modules d'alimentation en documents un à un successivement à partir du module d'alimentation le plus éloigné du module d'alimentation en enveloppes, afin qu'une pile initiale de documents totalement classés soit transmise au module d'alimentation en enveloppes, et destiné ensuite à transmettre des signaux de commande d'activation de tous les modules d'alimentation en documents, à chaque cycle de la machine,

caractérisé en ce que:

après l'arrêt de l'appareil de mise sous enveloppe, le dispositif de commande et de surveillance transmet un signal de commande, à chaque cycle de la machine, afin qu'il désactive les modules d'alimentation en documents un à un successivement à partir du module d'alimentation en documents le plus éloigné du module d'alimentation en enveloppes, si bien qu'une pile finale de documents entièrement classés est transmise au module d'alimentation en enveloppes et est introduite dans une enveloppe, et aucun document ne reste sur la plate-forme de transport.

2. Procédé de transmission automatique de piles de documents entièrement classés à une poste d'une machine de mise de documents sous enveloppe à plusieurs postes ayant plusieurs modules d'alimentation en documents, un module d'alimentation en enveloppes qui transmet des enveloppes et des piles de documents entièrement classés dans les enveloppes, une

plate-forme de transport qui transmet des documents des modules d'alimentation en documents au module d'alimentation en enveloppes, et un dispositif de commande et de surveillance destiné à transmettre des signaux de commande au cours d'un cycle de la machine afin qu'il active et désactive les divers modules d'alimentation, ledit procédé comprenant les étapes suivantes:

la transmission, lors de la mise en fonctionnement de la machine de mise sous enveloppe, d'un signal de commande, à chaque cycle de la machine, afin que les modules d'alimentation, en documents soient activés un par un successivement à partir du module d'alimentation en documents le plus éloigné du module d'alimentation en enveloppes, si bien qu'une pile initiale de documents totalement classés est transmise au module d'alimentation en enveloppes, puis

la transmission de signaux de commande destinés à activer tous les modules d'alimentation en documents à chaque cycle de la machine,

le procédé étant caractérisé en ce qu'il comprend en outre la transmission, après l'arrêt de l'appareil de mise sous enveloppe, d'un signal de commande, à chaque cycle de la machine, destiné à désactiver les modules d'alimentation en documents un par un successivement à partir du module d'alimentation en documents le plus distant du module d'alimentation en enveloppes, si bien qu'une pile finale de documents totalement classés est transmise au module d'alimentation en enveloppes et est introduite dans une enveloppe, et aucun document ne reste sur la plate-forme de transport.

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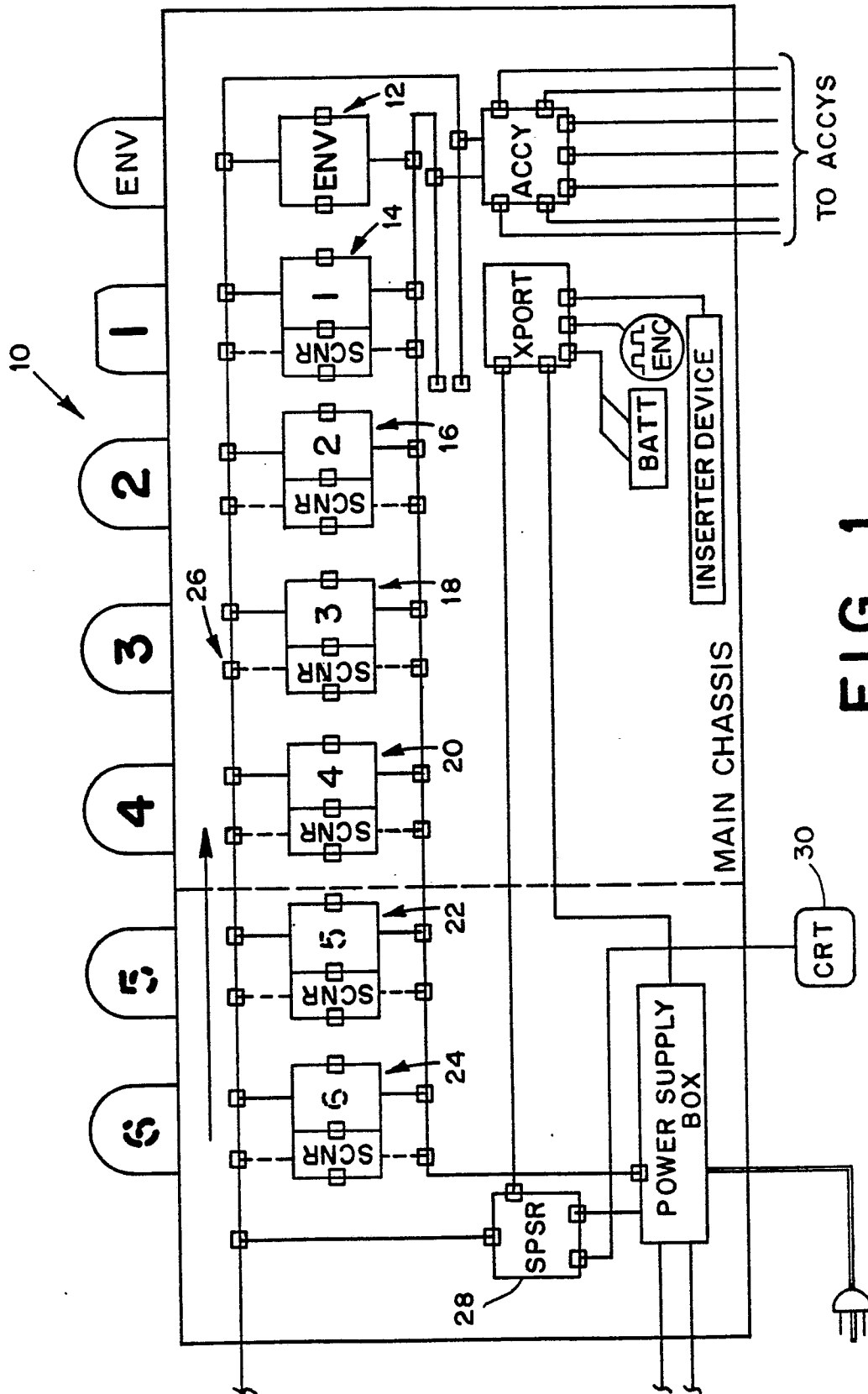
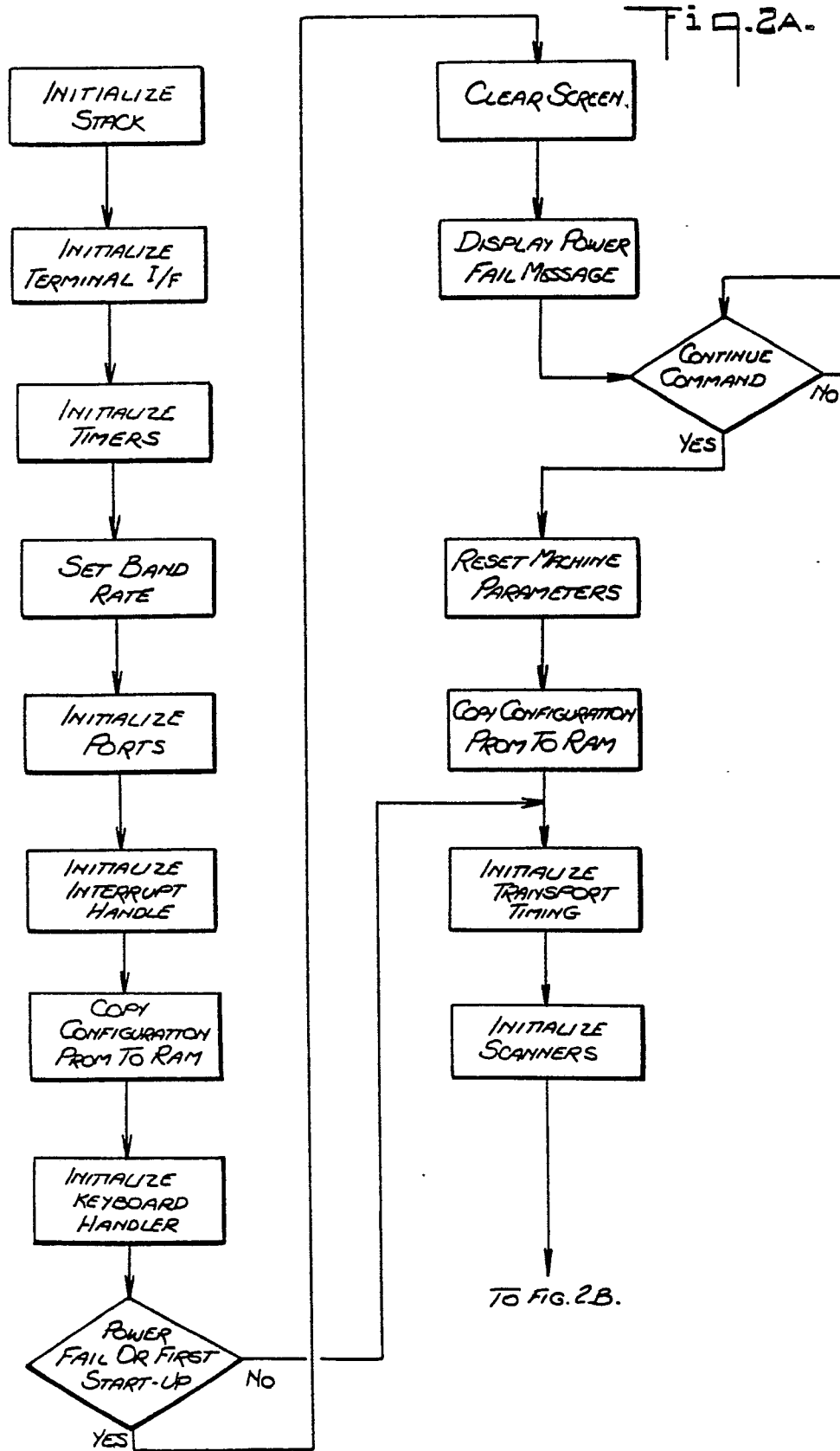
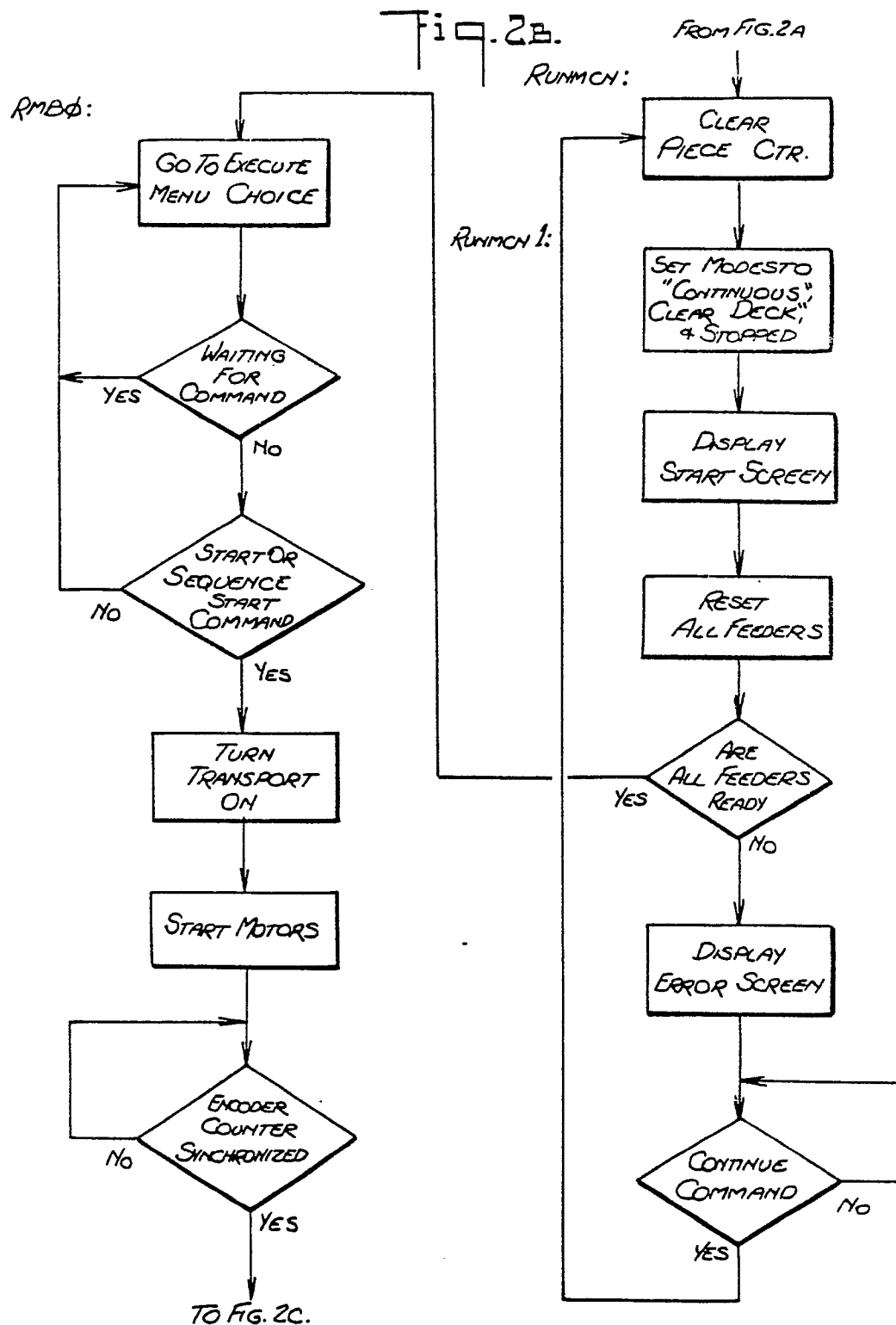
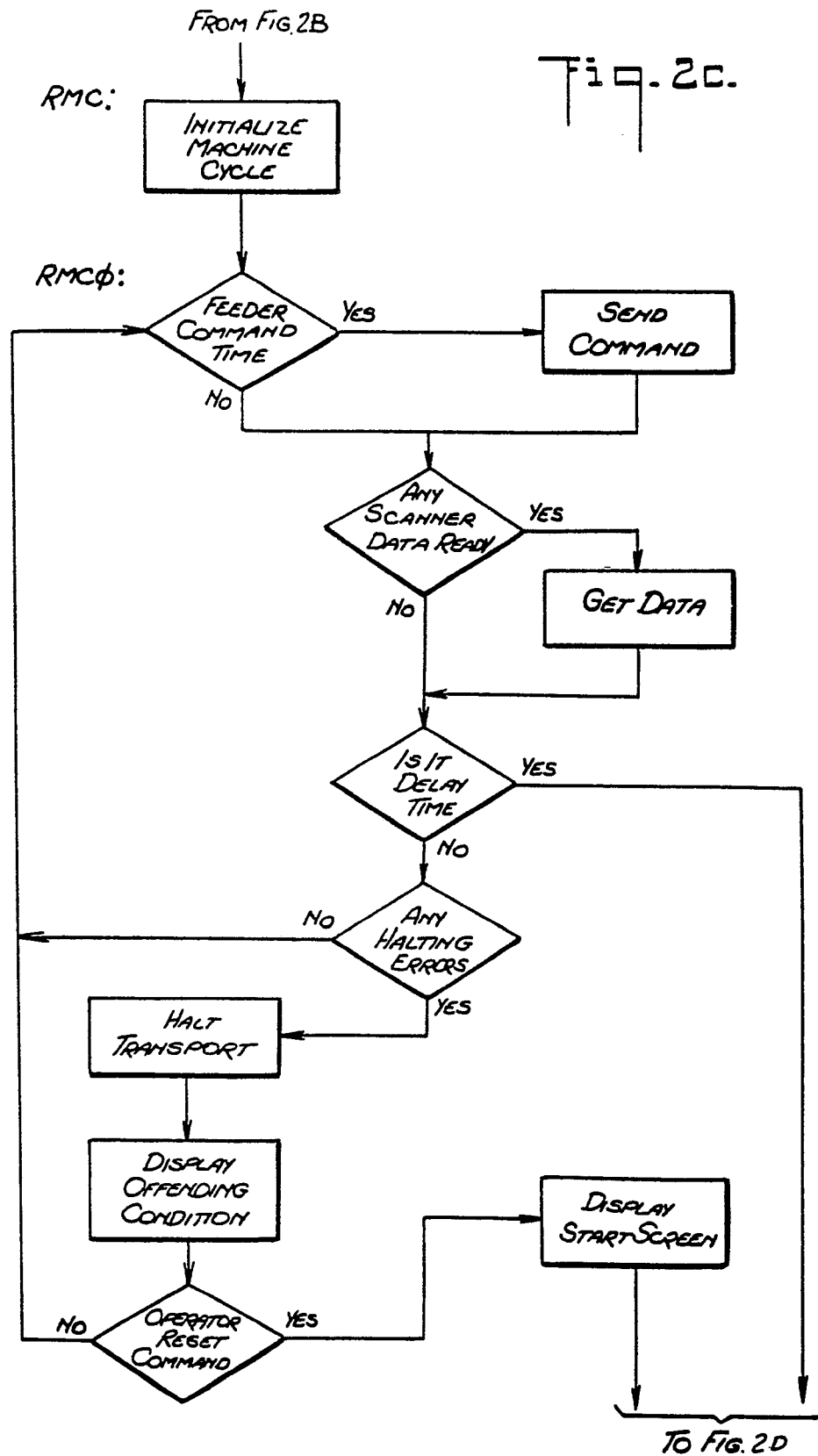


FIG. 1







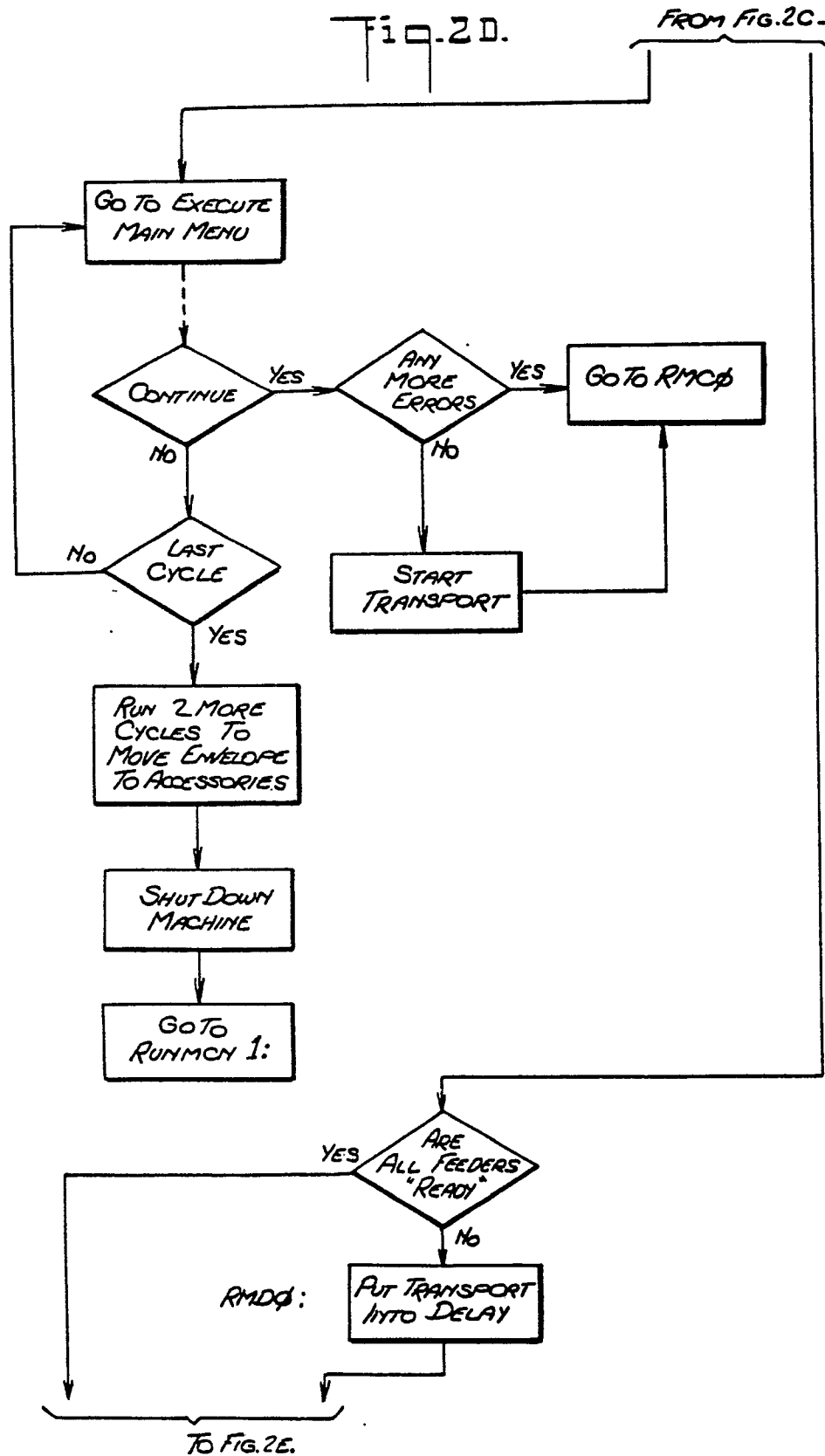
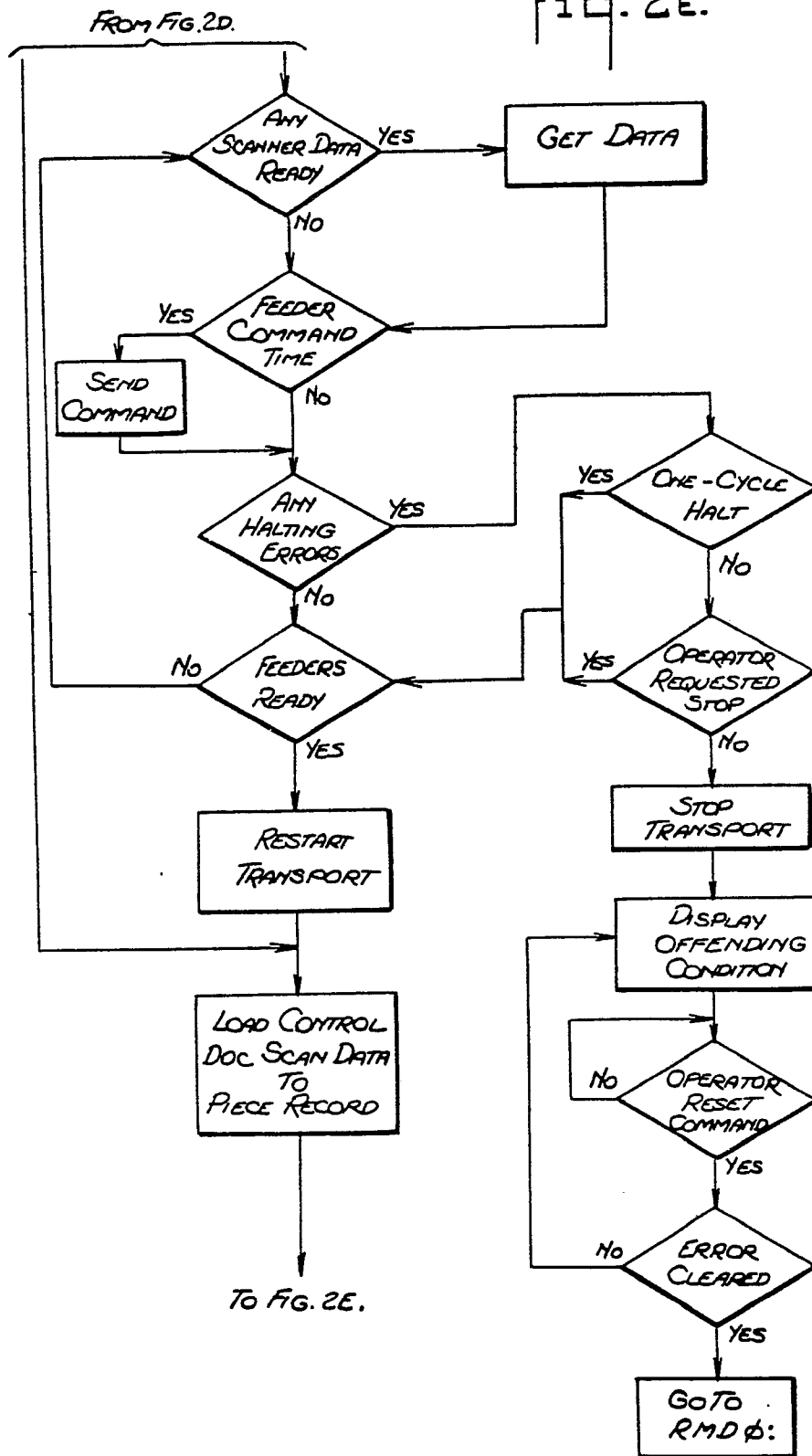


Fig. 2E.



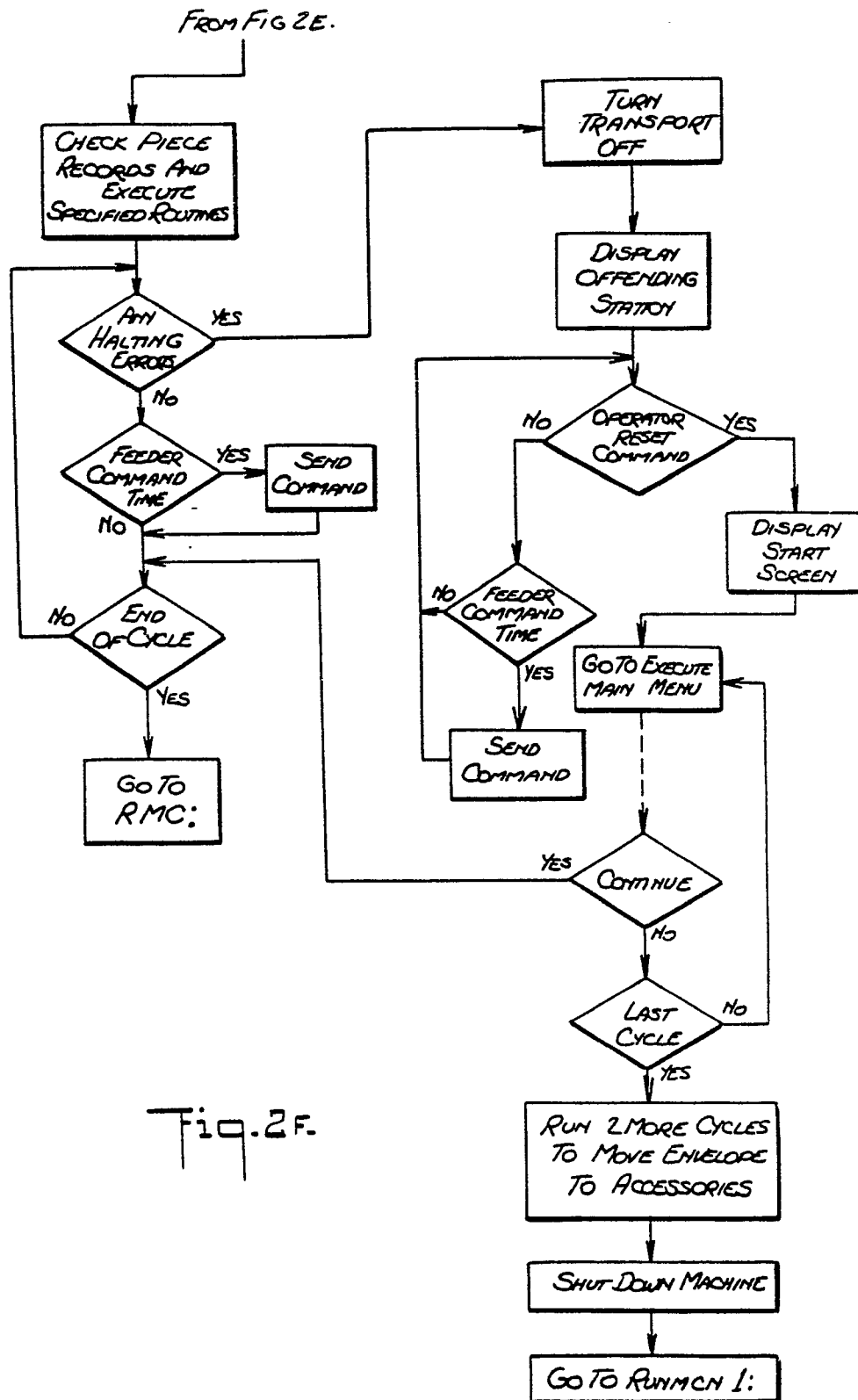
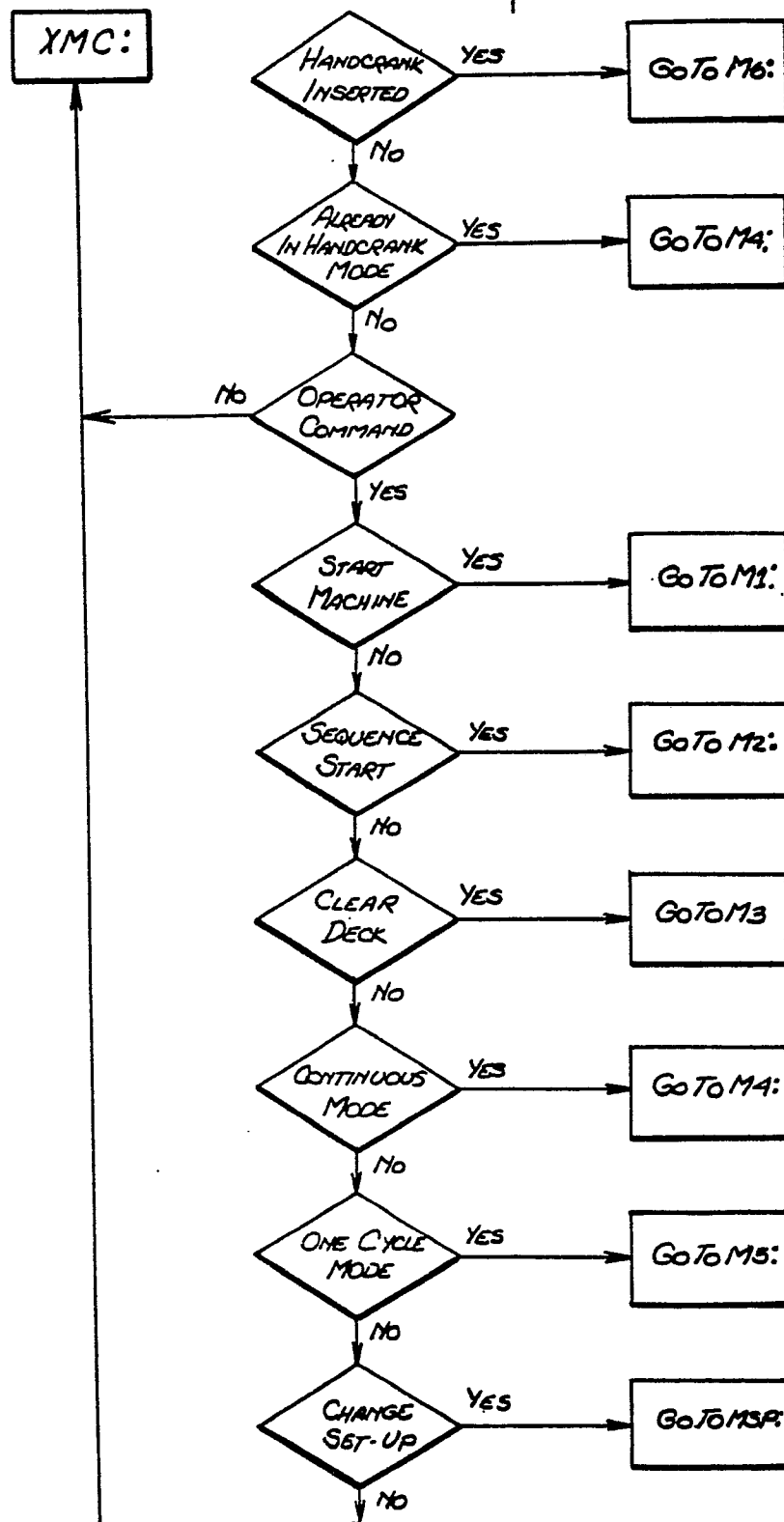


Fig.2F.

Fig. 2G.



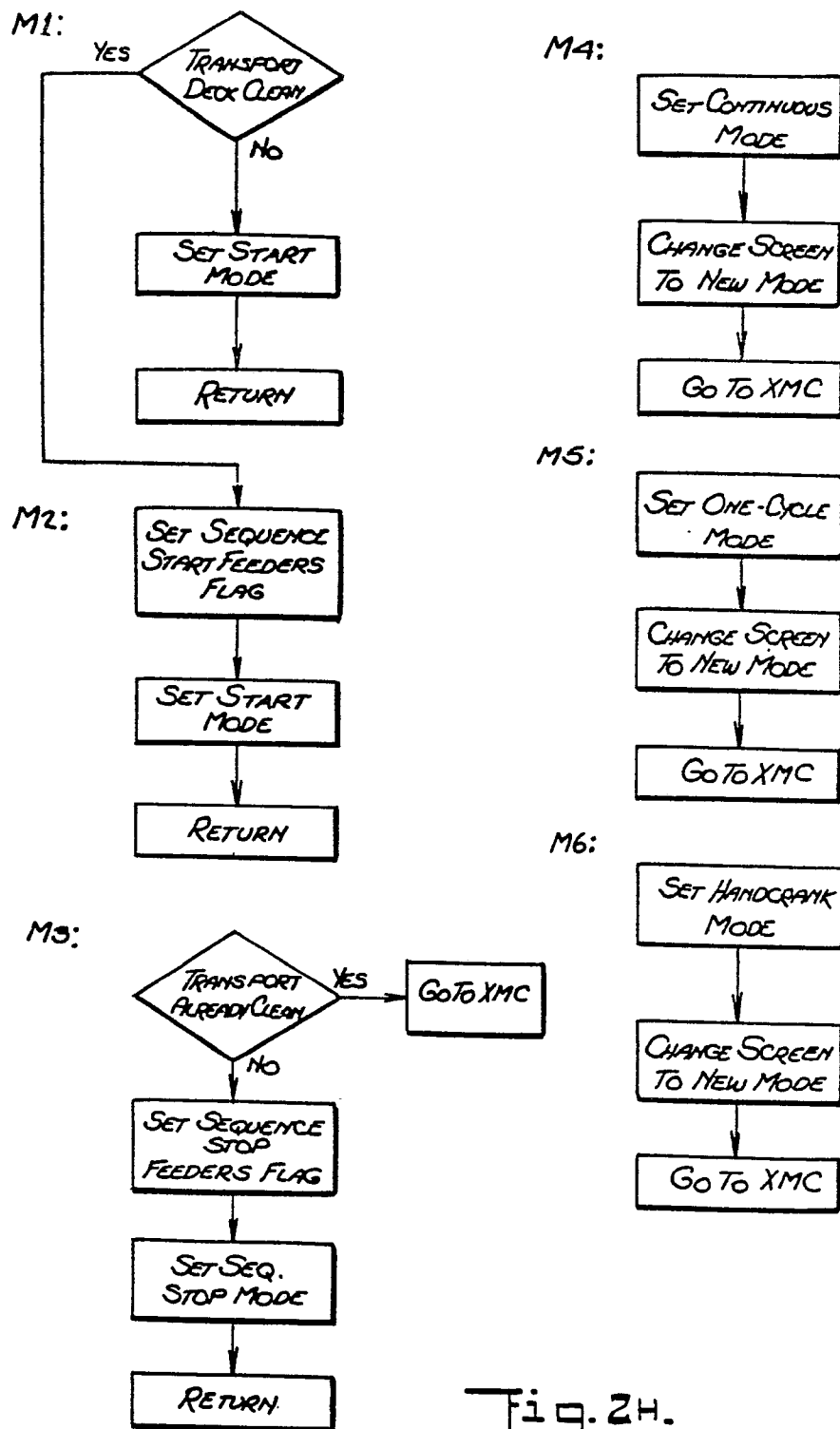
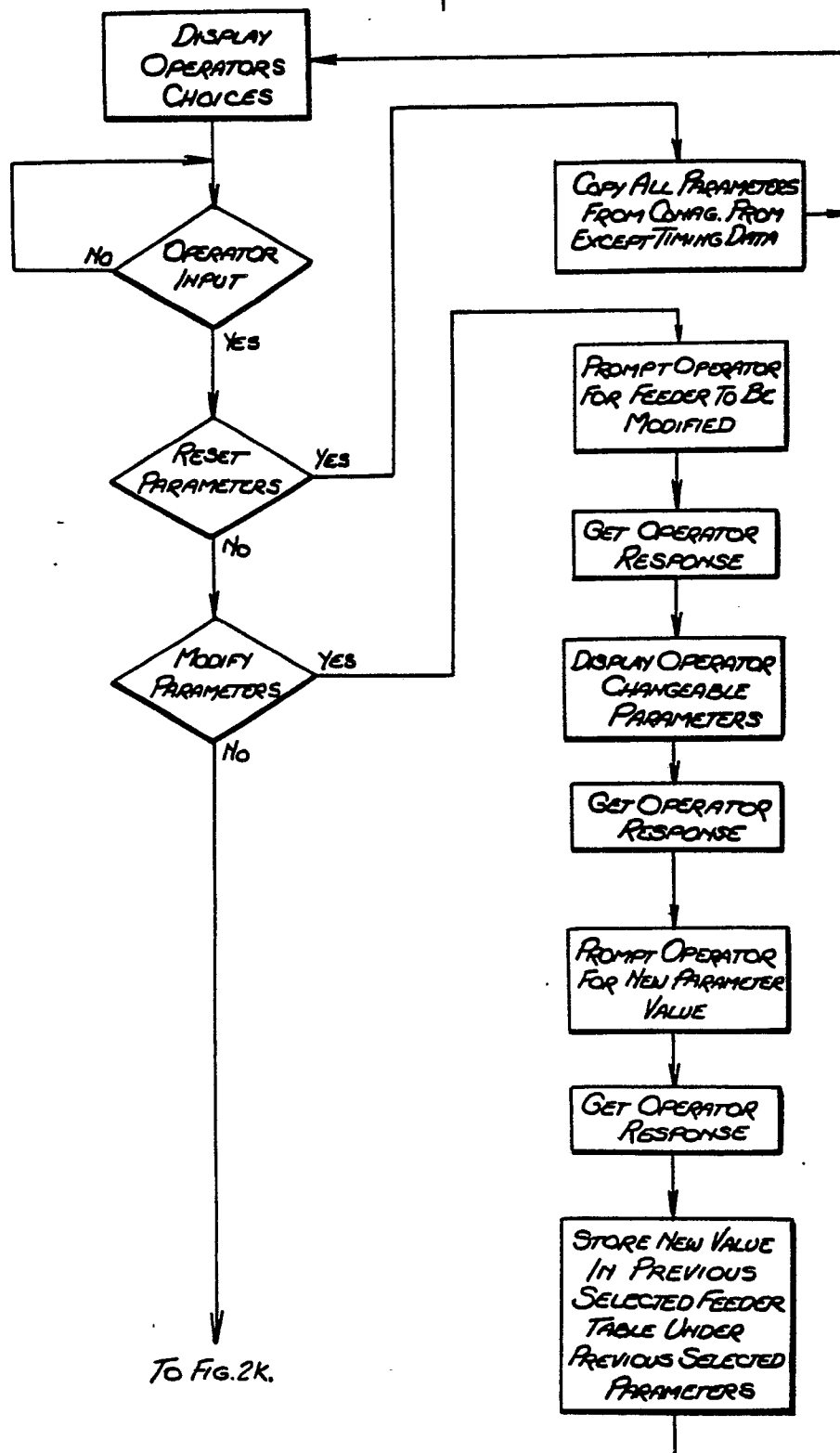
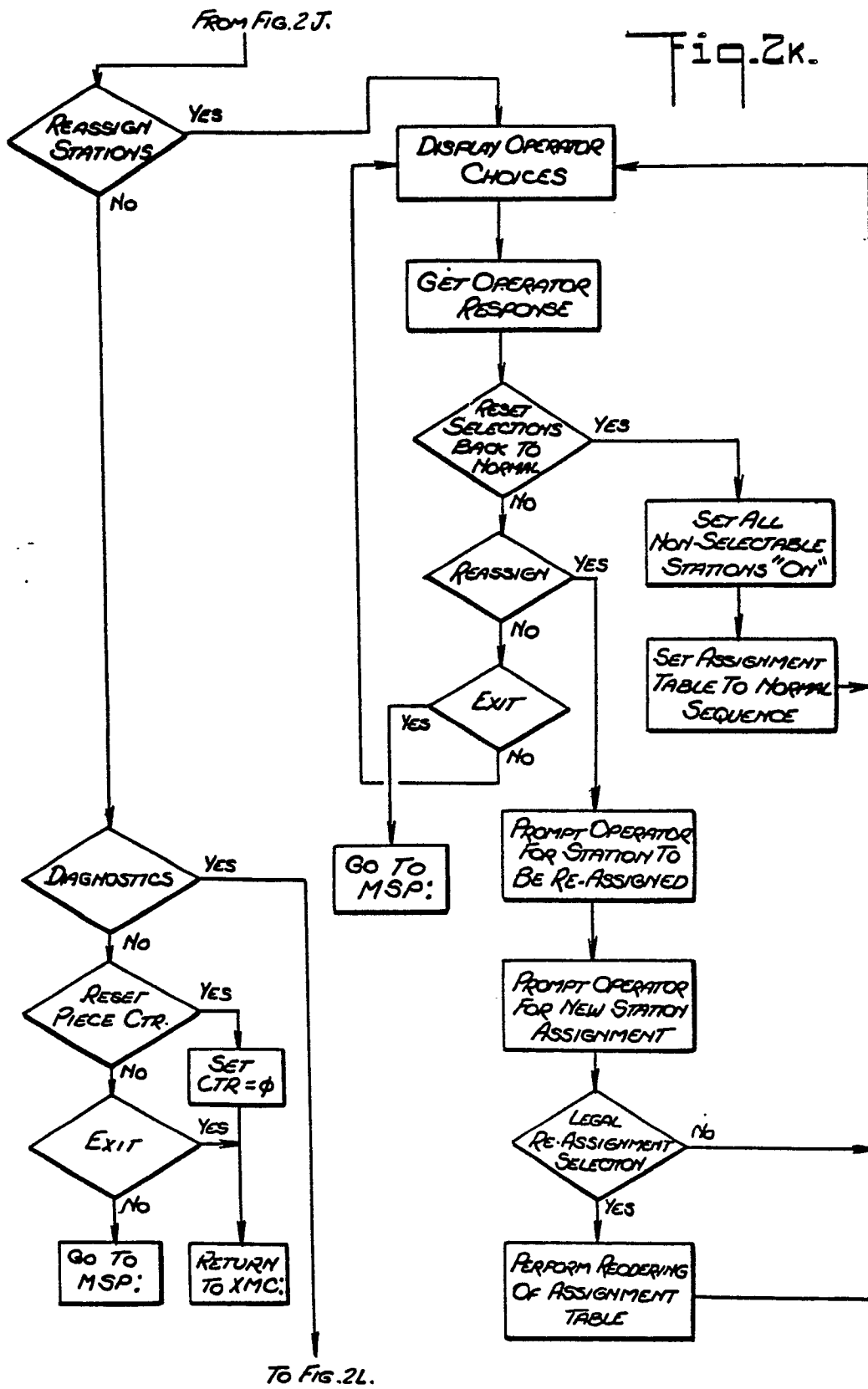
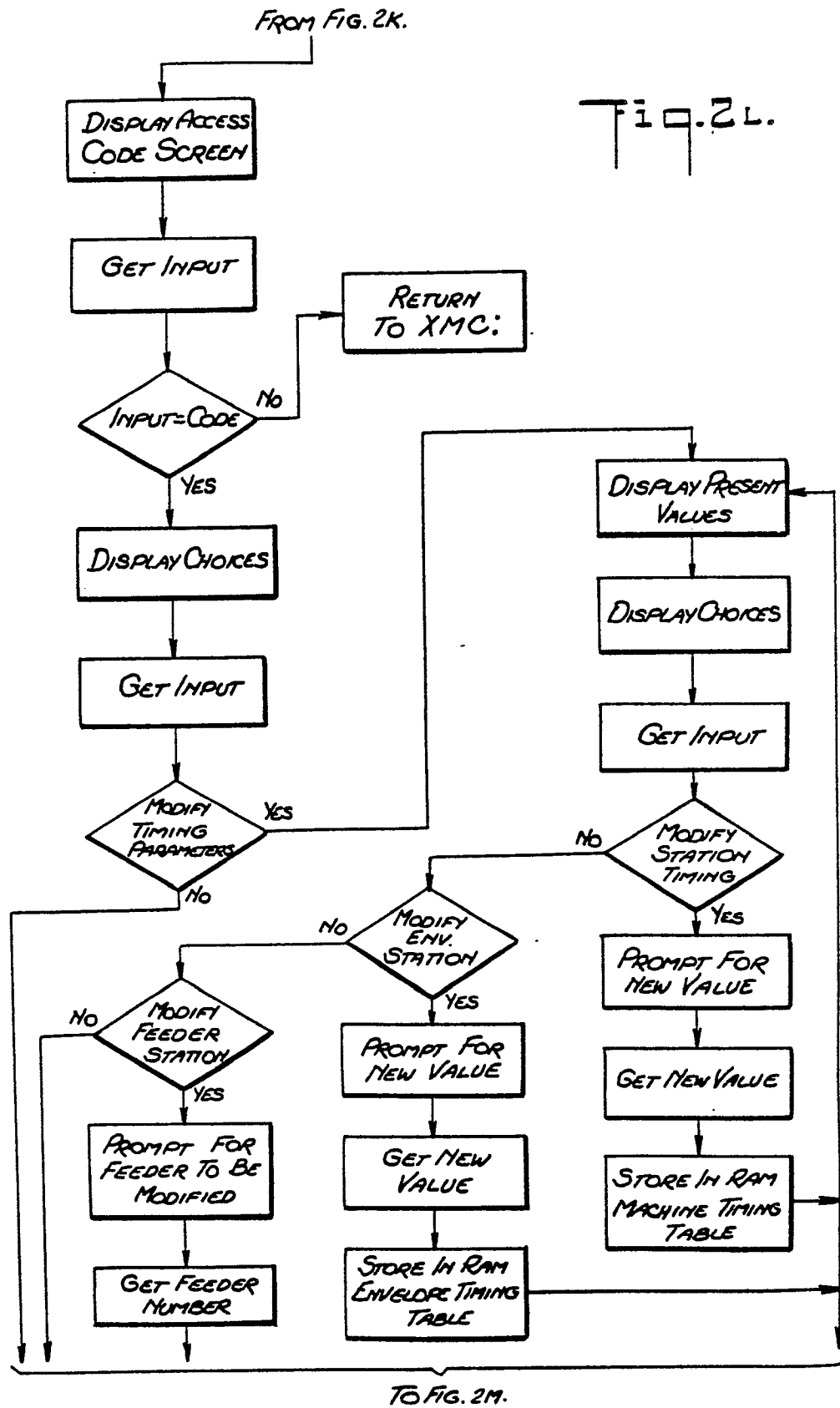


Fig. 2H.

Fig. 2J.







FROM FIG. 2L.

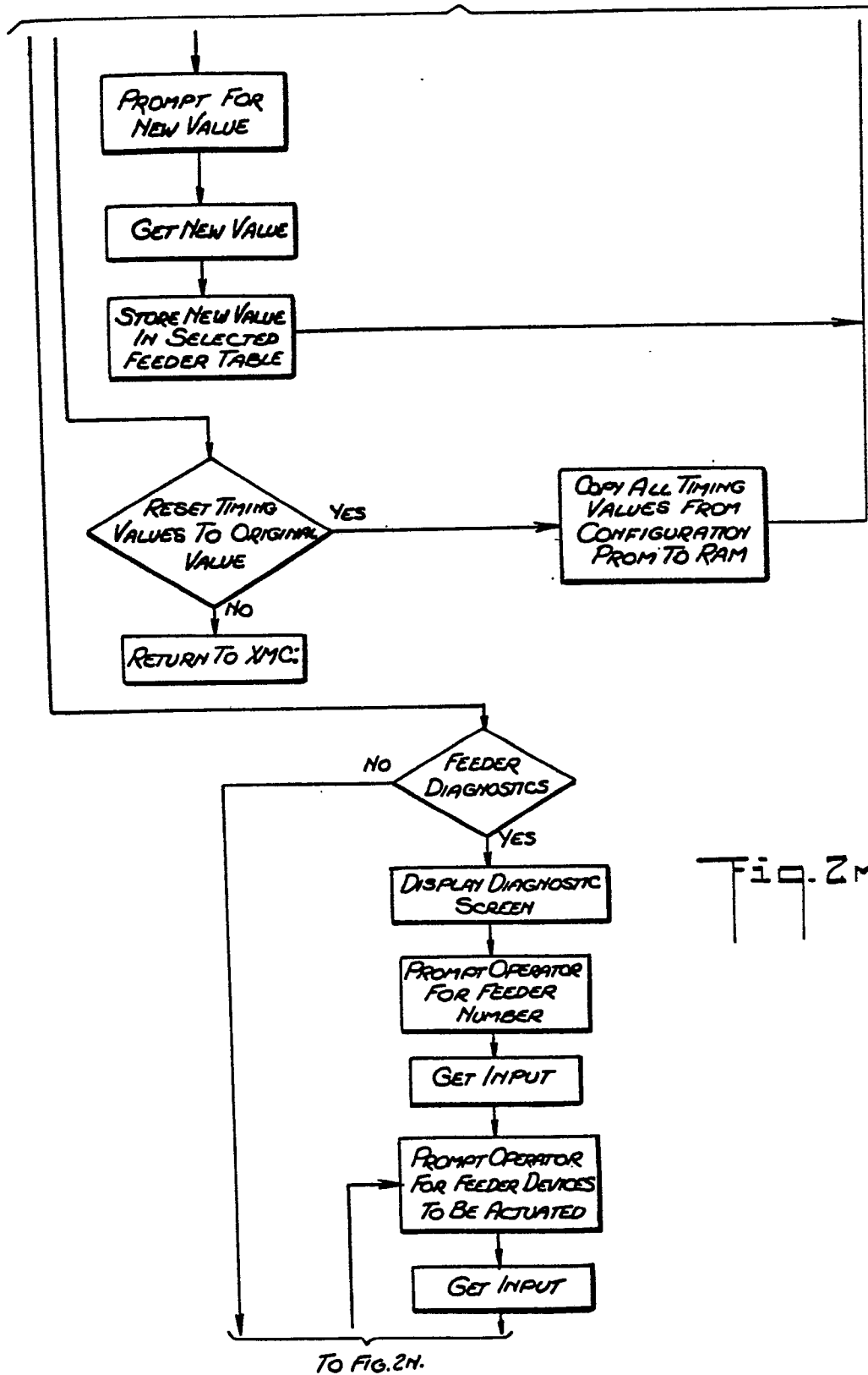


Fig. 2M.

